CLAIMS

What is claimed is:

1. A device for grasping tissue, comprising:

a tubular member having at a distal tip an annular surface surrounding a terminal port; and

at least one barb projecting at an angle from the annular surface of the tubular member, each at least one barb having a sharp edge configured to insert into the tissue and grasp the tissue as the tubular member is rotated about a longitudinal axis.

2. The device of claim 1, wherein the at least one barb includes a plurality of barbs spaced around the annular surface.

3. The device of claim 2 wherein the plurality of barbs are unidirectional with respect to one another.

4. The device of claim 1 wherein the tubular member comprises a cannula.

5. The device of claim 1 wherein the annular surface is a blunt surface with the barbs projecting at an angle from the annular surface.

6. The device of claim 1, further comprising a peripheral ring defining a reduced diameter portion on an inner surface of the tubular member adjacent to the distal tip.

7. A device for grasping tissue, comprising:

a tubular member having at a distal tip an annular surface surrounding a terminal port;

a plurality of barbs each having a sharp edge projecting at an angle from the annular surface of the tubular member;

a first lateral port formed in an external wall surface of the tubular member adjacent to the annular surface; and

a second lateral port formed in an external wall surface of the tubular member and spaced away from the annular surface.

8. A device for grasping tissue, the device comprising:

a cannula having at a distal tip an annular surface surrounding a terminal port; and

a plurality of sharp-edged barbs each projecting at an angle from the annular surface of the cannula and configured to grasp tissue when the cannula is rotated about a longitudinal axis.

9. The device of claim 8 wherein the barbs are unidirectional.

10. The device of claim 9 wherein the angle at which the barbs project from the annular surface is an acute angle.

11. A spinal delivery system to deliver a tool through tissue, the system comprising:

a tube having a longitudinal axial bore and, at a distal tip, an annular surface surrounding a terminal port;

a housing secured to a proximal end of the tube, the housing having an internal cavity with an aperture formed in a proximal surface thereof opposite the proximal end of the tube;

a tool sized and shaped to be slidably received within the bore of the tube and having a blunt distal tip portion sized to pass through the terminal port in the distal tip of the tube and a proximal end portion sized to pass through the aperture in the proximal surface of the housing, the tool mounted in the housing to move between an extended position wherein the distal tip portion extends beyond the distal tip of the tube and a retracted position wherein the distal tip portion is withdrawn inside the tube; and

a resilient compression member mounted in the housing and configured to engage the tool when the tool is at an intermediate position between the extended position and the retracted position to thereby urge the tool into the extended position.

12. An epidural grasping device, comprising:

a cannula having at a distal tip an annular surface surrounding a terminal port;

a plurality of barbs each projecting a sharp edge at an angle from the annular surface of the cannula;

a first lateral port formed in an external wall surface of the cannula adjacent to the annular surface; and

a second lateral port formed in an external wall surface of the cannula and spaced away from the annular surface.

13. The epidural grasping device of claim 12 wherein the sharp edges of the barbs are structured to engage tissue presented at the annular surface of the cannula by rotation of the cannula about a longitudinal axis.

14. A spinal tool delivery system, comprising:

a cannula having at a distal tip an annular surface surrounding a terminal port;

a housing secured to a proximal end of the cannula, the housing having an internal cavity with an aperture formed in a proximal surface thereof opposite the proximal end of the cannula;

a stylet having a blunt distal tip portion sized to pass through the terminal port in the distal tip of the cannula and a proximal end portion sized to pass through the aperture formed in the proximal surface of the housing, the stylet mounted between the distal tip of the cannula and the proximal end of the housing and movable between first loaded position having the proximal end portion thereof projected a predetermined distance from the proximal surface of the housing, and second discharged position having the distal tip portion thereof projected a predetermined distance from the distal tip of the cannula; and

a resilient compression mechanism compressed between a laterally protruding surface of the stylet and the proximal surface of the housing when the proximal end portion of the stylet is projected in the first loaded position the predetermined distance from the proximal surface of the housing, whereby the resilient compression mechanism applies a predetermined pre-load force on the stylet to urge the stylet to project in the second discharged position the distal tip portion thereof the predetermined distance from the distal tip of the cannula.

15. A spinal needle system, comprising:

a cannula having a bore terminating at a distal tip in an inner peripheral ring of reduced diameter surrounding a terminal port, the inner peripheral ring forming an annular surface in the terminal port;

a plurality of sharp-edged barbs projecting at an angle from the annular surface of the cannula and circumferentially aligned relative to a longitudinal axis of the bore of the cannula;

a housing formed of a distal housing portion coupled to a proximal portion of the cannula and a proximal housing portion releaseably coupled to the distal housing portion, the distal and proximal housing portions enclosing an internal cavity with an aperture formed in a surface of the proximal housing portion opposite from the distal housing portion;

a stylet having a blunt distal tip portion sized to pass through the inner peripheral ring surrounding the terminal port at the distal tip of the cannula, a shoulder portion at a predetermined setback distance from the extent of the blunt distal tip, the shoulder portion sized to interfere with the inner peripheral ring, and at a proximal end an indicator portion sized to pass through the aperture formed in the proximal housing portion, the stylet mounted between the distal tip of the cannula and the proximal end of the proximal housing portion and movable between a first arrangement having the proximal end portion thereof projected from the proximal surface of the housing, and a second arrangement having the distal tip portion thereof projected from the distal tip of the cannula and the shoulder portion in contact with the inner peripheral ring; and

a resilient compression mechanism compressed between a laterally protruding rigid surface of the stylet and the surface of the housing having the aperture formed therein when the indicator portion at the proximal end of the stylet is projected from the proximal surface of the housing in the first arrangement, whereby the resilient compression mechanism applies a predetermined pre-load force on the laterally protruding rigid surface of the stylet to urge the stylet to project in the second arrangement the distal tip portion thereof from the distal tip of the cannula.

16. A method of using a cannula having at least one barb projecting from a distal surface thereof, the method comprising:

inserting the cannula through a first layer of tissue;

detecting contact of the distal surface of the cannula with a second layer of tissue; and

rotating the cannula in a first direction about a longitudinal axis to urge the at least one barb into engagement with the second layer of tissue.

17. The method of claim 16, further comprising:

initially slidably receiving within a bore of the cannula a tool sized and shaped to be slidably received within the bore of the cannula and having a distal tip portion sized and shaped to pass through an annular port in the distal surface of the cannula; and

after the at least one barb is engaged with the second layer of tissue, passing the distal tip portion of the tool through the annular port in the distal surface of the cannula.

18. The method of claim 17 wherein passing the distal tip portion of the tool through the annular port in the distal surface of the cannula includes expanding a compressed resilient compression member against a surface of the tool to urge the distal tip portion of the tool through the annular port.

19. The method of claim 18 wherein the detecting contact of the distal surface of the cannula with a second layer of tissue includes visually detecting when the distal surface of the cannula contacts the second layer of tissue.

20. The method of claim 18, further comprising before detecting contact of the distal surface of the cannula with a second layer of tissue, visually detecting when the distal surface of the cannula penetrates the first layer of tissue.

21. The method of claim 18, further comprising disengaging the at least one barb from engagement with the second layer of tissue by rotating the cannula about the longitudinal axis in a second direction opposite from the first direction.

22. A method of using a spinal needle delivery system comprising a cannula having at least one barb projecting from a distal surface thereof and a blunt stylet projecting from a portal in the distal surface thereof under pressure from a resilient biasing member, the blunt stylet movable relative to the distal surface of the cannula by compression and expansion of the resilient biasing member; an indicator portion generating an indication as a function of a degree of projection of the blunt stylet relative to the portal in the distal surface of the cannula; and a cannula lock coupling an adhesive band to the cannula, the method comprising:

in a previously perforated first layer of relatively high resistance tissue, enlarging the perforation sufficiently to permit entry of a distal tip of the blunt stylet;

stabilizing the spinal needle delivery system relative to the enlarged perforation;

advancing the distal tips of the blunt stylet and the cannula into and through the enlarged perforation in the layer of relatively high resistance tissue;

using the indicator, determining that the distal tip of the blunt stylet has passed through the enlarged perforation in the layer of relatively high resistance tissue into a space of relatively low resistance;

securing the cannula lock to the shaft of the cannula, thereby fixing the adhesive band relative to the cannula and advancing the distal tips of the blunt stylet and the cannula

through the space of relatively low resistance and into contact with a second relatively high resistance tissue;

using the indicator, determining that the distal tip of the cannula has contacted the second relatively high resistance tissue;

rotating the cannula into an engaged position by rotating the cannula in a direction to engage the barbs with the second relatively high resistance tissue until resistance to continued rotation is encountered;

supporting the cannula in the engaged position while advancing the cannula lock and adhesive band along the shaft of the cannula until the adhesive band contacts but does not depress the first layer of relatively high resistance tissue adjacent to the enlarged perforation;

adhering the adhesive band to the first layer of relatively high resistance tissue; and

supporting the cannula of the spinal needle delivery system.

23. The method of claim 22, further comprising retrieval of the spinal needle delivery system by:

separating the adhesive band from the first layer of relatively high resistance tissue;

rotating the cannula into a disengaged position by rotating the spinal needle delivery system in a direction to disengage the barbs from the second relatively high resistance tissue; and

withdrawing the spinal needle delivery system from the perforation.